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Cardiovascular Disease and Its Risk Factors Among Employees of Sindh Government; A Cross Sectional Survey from Karachi, Pakistan

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Abstract:

Introduction: Globally it is documented that CVD has multi-factorial aetiology and many factors like increased BMI, hypertension (HTN), stress and diabetes determine the risk of CVD. The prevalence of risk factors for cardio vascular disease (CVD) is on increase in the developing nations of the world.

Objectives: The purpose of the study was to find out the prevalence of cardiovascular disease and its risk factors among employees of Sindh Government in Karachi, Pakistan.

Method: It was hospital based cross sectional study. A total of 150 subjects (govt employees of Sindh Government) were interviewed by using consecutive sampling technique. Data on serum cholesterol, BMI, blood pressure, history of hypertension, diabetes and cardiovascular diseases was collected, in addition to demographic data.

Results: Out of 150 subjects interviewed, 20.6% reported to have CVD. The most prevalent risk factor was hypertension, found in 58% respondents. Other risk factors were diabetes (45%), sedentary life style (50%), obesity (28%), dyslipidaemia (30%), smoking (20%), positive family history (26%). In 6% of subjects, three major risk factors were present. The risk factors, strongly associated with CVD in our study were diabetes ($p<0.01$), hypertension ($p<0.001$) and family history of CVD ($p<0.02$). There is strong association of increasing age on risk of developing CVD ($p< 0.001$).

Conclusion: The results show that there is high frequency of CVD risk factors in employees of health department in Karachi. The high prevalence of risk factors, especially hypertension, sedentary life style, obesity and diabetes should be of great concern.

Keywords: Cardiovascular disease, Ischemic heart disease, Risk factors

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Abbreviations:
BMI: Body Mass Index
CHD: Congestive Heart Disease
CVD: Cardiovascular Disease
HTN: Hypertension
IHD: Ischemic Heart Disease

Introduction:

The world today is seeing a new epidemic that would have devastating consequences, unless it is stopped. Worldwide, cardiovascular disease is accounting for most of deaths due to chronic disease (1), and most of the global burden of CVD is presently in low- and middle-income countries (2,3). The prevalence of risk factors for CVD is on the increase in the developing nations of the world. Ischemic heart disease is reported to be the principal cause of

mortality in parts of Pakistan (4). Moreover, in Pakistan, CVD emerges at an earlier age as compared to western countries (5,6,7) and hence increased mortality in comparatively young age group (8).

Globally it is documented that CVD has multi-factorial etiology and many factors like increased BMI, hypertension (HTN), stress and diabetes determine the risk of IHD (9,10,11,12,13). A study of 52 countries globally, showed that abdominal obesity had odd ratio of 1.62 for developing acute myocardial infarction (14), a smaller odds ratio has been reported by a hospital study in Pakistan (15). Advancing age and low socio-economic status are also recognized risk factors for IHD (16).

Evidence suggests that risk factors for CVD, like hypertension, smoking, diabetes and obesity are alarmingly high in Pakistani population (17, 18). In a survey carried out in Karachi, prevalence of hypertension was 25%, while 72% women had abdominal obesity (19).

Most of the available epidemiological studies were among samples of subjects or volunteers from the general population with little emphasis on the workers. The quality of life, health awareness, and adoption of healthy behaviors by main workforce have effects on the overall productivity and the disease burden (20). The present study is carried out, to see the prevalence of CVD risk factors in employees of Sindh government. CVD risk factors among the workers will lead to recommendations that can motivate employers and policy makers to put CVD prevention among their priorities.

Objectives:
To find out (1) the prevalence of cardio vascular disease and its risk factors in employees of Sindh Government (2) to determine the association of risk factors with the cardiac disease.

Subjects and Methods:
It was hospital based cross sectional study conducted between March 2016 - July 2016 in Sindh Rangers Hospital and Jinnah Postgraduate Medical Centre. The patients aged between 18-60 yearrs willing to give informed consent were included in the study. Assuming the prevalence of CVD as 6.25% (17), and margin of error as 5%, a sample size of 150 was calculated setting alpha at 0.05 using WHO sample size calculator. Patients reporting to Medical Reception Centre (MRC) were interviewed by using non-probability, consecutive sampling technique.

Data collection: A self-administered questionnaire was adopted to document the demographics (age, gender, education , work status), behavioral characteristics (tobacco use, stress, level of physical activity), anthropometric and biochemical measurements (BMI, Serum lipid profile) of the participants, along with history of hypertension, diabetes, cardiovascular diseases (physician diagnosed cases of CVD including conditions like stable angina, unstable angina, myocardial infarction or acute coronary syndrome), and positive family history of cardiac disease. Physical activity was defined as engaging in moderate-intensity physical activity or walk for at least 30 minutes 5 days per week or 20 minutes of vigorous activity 3 days/week and a person who smokes one or more cigarette per day was labeled as current regular smoker. Stress was defined by self-report.

Baseline data: Measurements were made by trained nursing assistants. Height was measured without shoes with the participant standing erect and looking straight ahead with his head in the Frankfort horizontal

plane. Height was recorded to the nearest 0.5 cm. Weight was measured (to the nearest kg) using a spring balance with the participant wearing light clothing. BMI was calculated as kg/m². BMI ≥ 25 was labeled as being overweight and ≥ 30 as obese (21, 22). Blood pressures were measured using a standard sphygmomanometer. A systolic BP of more than 140 or diastolic BP of more than 90 or current use of antihypertensive medications was taken as hypertension. Diabetes was defined by self-report.

Blood testing: All participants were instructed to fast overnight for at least 8 hours prior to collection of the fasting blood sample. Boundary values of total cholesterol ≥200 mg/dl, were taken as hypercholesterolemia (23).

Risk Score: Risk score was estimated by using Omnibus risk estimator for calculating 10 years risk for ASCVD (Atherosclerotic cardiovascular disease) by American college of Cardiology and American Heart Association 2014. For this calculation values of age, race, total body cholesterol, level of HDL, and history of diabetes, treatment of hypertension, systolic blood pressure and history of current smoking were used.

Statistical Analysis: SPSS statistical packages version 22 was used to produce descriptive analysis. Mean age (mean ± SD) of the participants was calculated & categorical variables were presented by frequency and percentages. Chi-square test was used to determine the statistical association. A p-value less than 0.05 was considered as a significant value.

Results:

A total of 150 subjects (service men) were interviewed, with mean age of 43.5 ± 6.36 years. Out of them 29 (19.3%) were doing office job, 18 (12%) were on clerical job, 94

(62.7%) respondents were office attendants, only 6% (9) respondents were deputed on manual labour. Mean length of service reported was 21 ± 5.56 years.

Out of 150 subjects interviewed, 20.7% (31) reported to have CVD. Table 1 shows the frequency of risk factors among the respondents.

Table 1: Prevalence of risk factors of CVD in Subjects

Sr.No	Risk factor	Frequency	Percentage
1	Positive family history	39	26
2	Current smoking	31	20.7
3	Sedentary life style	75	50
4	H/O Diabetes	68	45
5	Hypertension	87	58
6	Stress	30	20
7	Total body cholesterol High(borderline) 200-240	34	23
8	Total body cholesterol High risk, more than 240	11	7
9	BMI 25to <29(over weight)	76	51
10	BMI equal to or>29 obese	42	28

Multiple Risk Factors: We also grouped the subjects, based on three major risk factors for CVD i.e. Diabetes mellitus, dyslipidaemia and hypertension. Among the respondents, 38 (25.3%) had none, 69 (46%) had any one, 34 (22.7%) had any two and 9 (6%) had all three of these risk factors.

Relationship of risk factors with CVD: Out of 150, 31 (20.6%) respondents in our study were found to have CVD. The risk factors, strongly associated with CVD in our study were diabetes (p<0.01), hypertension (p<0.001) and family history of CVD (p<0.02). See Table 2.

By using Omnibus risk scoring calculator, the risk for developing ASCVD was calculated, i.e. the probability of developing CHD over a given time period (next 10 years). Out of 119 subjects (subjects free from CVD), 60(50.4%) respondents were having 1-5% chance for developing CVD in next 10 years. 31 (26%) having 6-10% and 2 (1.6%) having 35-40% chance for developing ASCVD in next 10 years (Fig. 1).

Table 2: Relationship of risk factors with CVD

Sr. No.	Risk factors	Not diseased (n=119)	Diseased (n=31)	p-value
1	Normal BMI (18.5-<23)	26	6	.83
	BMI >23 (overweight)	61	15	
	BMI>27 (Obese)	32	10	
2	Current Smoking	24	7	.76
	No smoking	95	24	
3	Total Cholesterol (more than 200mg/dl)	36	9	.89
	Normal cholesterol (< 200)	83	22	
4	H/o Diabetes	60	8	.01 P**
	No H/O Diabetes	59	23	
5	Hypertension	61	26	.001 P**
	No Hypertension	58	5	
6	Physical Activity (Sedentary life style)	55	20	.07
	Physically active	64	11	
7	Positive Family History	26	13	.02 P*
	No family history	93	18	

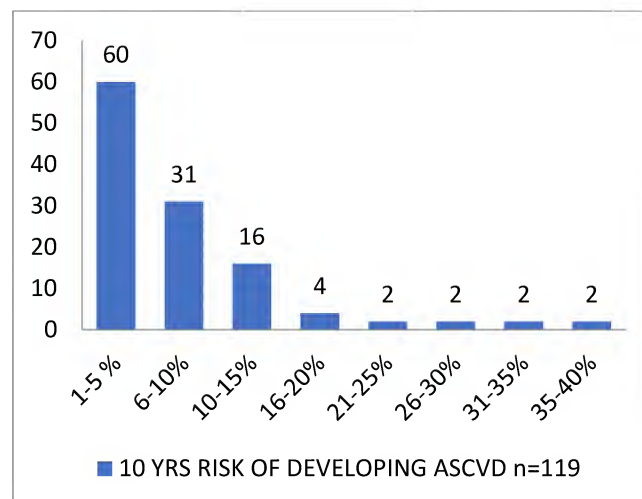p*< 0.05 significant, p** < 0.01 highly significant

Figure 1: 10 Years risk of developing ASCVD (n=119)

Table 3: Relationship of increasing age with risk of developing CVD (n=119)

Sr. no	Age	10 years risk of developing CVD							
		1-5%	6-10%	11-15%	16-20%	21-25%	26-30%	31-35%	35-40%
	25-34 years	7	3	2	0	0	0	0	1
	35-44 years	30	18	8	2	0	0	0	0
	45-54 years	23	10	6	1	1	0	1	0
	55-64 years	0	0	0	1	1	2	1	1
	Total	60	31	16	4	2	2	2	2

The relationship between age and risk of developing CVD was calculated by using Fischer exact (variant of chi square) test. There was strong association (p < 0.001) of increasing age with risk of developing CVD (Table 3).

Discussion:

Many developed countries have made enormous progress in controlling the epidemic of CVD by preventive measures and treatments focused on the cardinal risk factors of dyslipidaemia, HTN and smoking. (24) These risk factors included non-modifiable risk factors (e.g., age, sex, family history, and the social and ethnic differences) as well as 'modifiable' risk factors (e.g., smoking, raised blood cholesterol, HTN, physical inactivity, obesity and stress (25).

Hypertension is the main risk factor for CVD and its prevalence rises with age (26).

According to present study, prevalence of Hypertension is 58% as compared to another study conducted in Karachi the prevalence of HTN was 26% (27). The risk of coronary artery disease is strongly associated with high blood pressure in our study with p-value less than 0.001.

Overweight/obesity is an established risk factor for CVD and diabetes (28). Our study showed a high prevalence of overweight/obesity i.e., 51% and 28% respectively and it was the most prevalent CVD risk factor along with hypertension similar to a study conducted in Chandigarh, India (29). The study also showed that sedentary life style was more predominant i.e., 50%, it might be contributory to the high prevalence of overweight and obesity. It is noteworthy that participants in this study were predominantly the office attendants who were deployed on general /light duties only (62%), only 6% of employees reported who were on manual labour.

Another important risk factor was hypercholesteremia, 30 % of the participants in the study were having hypercholesterolemia (total body cholesterol more than 200), similar to another study conducted in Karachi where 21% participants had fasting cholesterol between 200-239 and 10.3% had greater than 240 mg/dl (30).

CVD is a major complication of diabetes—about 65 percent of people with diabetes die from heart disease and stroke (9). In our study the prevalence of diabetes was 45%, and it was significantly associated in patients with CVD in this study (p<0.01), the results were very similar to a study conducted in Iran and India (28, 31) and similar to the observation in other South-east Asian countries (32).

Smoking was found in 20% of the participants and more prevalent in age group of 35-45 years while in another study of southern Punjab, smoking was found in 37% of population (33).

The important point of cardiovascular disease is the synergistic effect of more than one risk factor on overall cardiovascular disease risk. Even moderate elevations in more than one risk factor increase cardiovascular disease risk (34). This study population showed that 46% had at least one risk factor but we did not include sedentary lifestyle and smoking while evaluating multiple risk factors, which would have increased this figure further. It is also worth mentioning that only 25.3% of participants were completely free from any risk factor and 6% had 3 risk factors while studies conducted in Bahrain (20) and Oman (35) only 4.6% of participants had 3-5 risk factors.

The quantitative relationship between the risk factors and CHD risk has been elucidated by the Framingham Heart Study and other studies. These studies (35) show that the major risk factors are additive in predictive power. Accordingly, the total risk of a person can be estimated by a summing of the risk imparted by each of the major risk factors (36). In this study, risk score for developing CVD within next 10 years was calculated. It was found that the risk factors had synergistic

effect in scoring but increasing age has direct strong association with risk score (p<0.001). Risk estimates are useful both for short-term, high-risk primary prevention and for long-term (or lifetime) primary prevention.

Conclusion:

The results show that the proportion of CVD risk factors is quite dominant in employees of Sindh Government in Karachi, but more research is required to understand the reasons behind these phenomena. The high prevalence of risk factors like hypertension, sedentary life style, obesity and diabetes is of great concern with possible sequelae of cardiac arrest and heart failure.

Limitation of Study:

The study was conducted in cross sectional methodology, so inference could not be drawn regarding causal association. Longitudinal studies are more powered to address this issue. Moreover consecutive sampling was used in the study so the results may not be the truly representative of general population, but it will provide baseline data regarding burden of risk factors in Pakistani government employees.

Conflicts of Interest: This study has no conflict of interest to declare by any author.
Human and Animal Rights: No rights violated
Statement of Informed Consent: The data was collected after verbal informed consent.

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